

Reoperation for Stoma-Related Complications

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ABSTRACT

Stoma complications are common. Most do not require reoperation, but when surgery is indicated, numerous options are available. Complications can arise early or late, and they can vary from benign to life-threatening. Meticulous preoperative planning is crucial in preventing stoma complications. Good communication with the patient is important in the decision-making process.

KEYWORDS: Stoma, complications, reoperation

Objectives: Upon completion of this article, the reader should be familiar with the operative management of stoma-related complications.

Complications after creation of a stoma are common. They range from benign, asymptomatic nuisances to more serious, potentially life-threatening conditions. The most effective method of preventing a stoma complication is avoiding the creation of a stoma. This, of course, is sometimes unavoidable. However, use of intraoperative colonic lavage allows performance of a one-stage operation in patients with left colon obstruction and diverticular disease without any increase in postoperative complications.^{1,2} Performance of primary anastomosis in emergency colorectal surgery has also been shown to be feasible without increased postoperative morbidity.³

If creation of a stoma is inevitable, preoperative planning is critical. Consultation with an enterostomal therapy nurse can help immensely with marking of an ideal site for a stoma. It is a good idea to mark more than one potential site. It is also important to consider the patient's clothing style, belt line, bone prominences, and scars from previous operations. The stoma site should be selected with the patient sitting, standing, and in supine position with normal clothes.

When stoma complications do arise, only a minority of them require reoperation. Most complications

can be managed conservatively. It is important to discuss with the patient the therapeutic options and start with the least invasive procedure. The patient's satisfaction with the current stoma site can determine the decision-making process (Fig. 1).

Complications can be categorized into early and late (Table 1). Common early complications include metabolic derangement, skin irritation, ischemia, and stoma retraction. Common late complications are parastomal hernia, prolapse, and stenosis. This article reviews complications that may require reoperative intervention.

EARLY COMPLICATIONS

Ischemia

Signs of ischemia usually arise within 24 hours. The stoma first appears edematous with bluish discoloration and then progresses to necrosis. A common cause of ischemia is an inadequate arterial blood supply secondary to damage to or an inappropriately divided vascular arcade supplying the left colon. The colonic vessels placed under too much tension can lead to endothelial damage and decreased perfusion. This could be avoided

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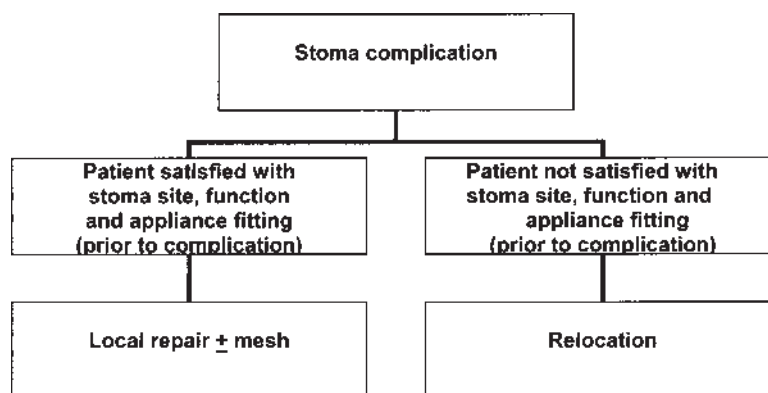


Figure 1 Decision-making algorithm in the management of stoma complications.

by dividing the inferior mesenteric artery at its origin, thereby reducing excess tension. Another possible etiology is excessive trimming of the mesentery (more than 5 or 6 cm) during the creation of an ileostomy. Excessive tension or delayed thrombosis in the mesenteric vessels adjacent to the ileostomy may be a contributing factor in some patients. If inadequate venous drainage is present from an injured venous arcade close to the bowel wall, it could cause stoma edema but rarely causes tissue loss.

Depth of ischemia can be assessed with an endoscope, glass test tube with an external light, or puncture with a needle. An ischemic stoma does not bleed after puncture by a needle. If ischemia is superficial, close observation is adequate. Full-thickness necrosis above the fascia could lead to stenosis later, especially if it extends more than 1 or 2 cm, and early revision is recommended to prevent future stenosis. If necrosis extends below the fascia, an urgent reoperation is required.

Mucocutaneous Separation

Mucocutaneous separation is caused by inadequate or improper approximation of the mucosa to the dermal layer or excessive bowel tension. It can also be caused by infection, steroid use, and malnutrition. If it is minor, observation is adequate. The separated area should be filled with skin barrier powder, alginate, or hydrofiber, and it should be covered with a solid skin barrier.⁴ As the separation heals, it can lead to stenosis and close follow-up is needed. Complete separation may require a local revision.

Table 1 Stoma Complications

| Early | Late |
|---------------------------|---------------------------|
| Dehydration (high output) | Stoma retraction |
| Stoma ischemia | Stoma prolapse |
| Bowel obstruction | Parastomal hernia |
| Stoma stenosis | Fistula Variceal bleeding |
| Mucocutaneous separation | Ulceration/skin problems |
| Fistula | Bowel obstruction |

Stoma Retraction

Stoma retraction is caused by excessive tension on the bowel or stoma placed at a poorly selected site. Ischemia can also produce retraction, and it is associated with stenosis in such a situation. It is one of the most common reasons for reoperation. Stoma retraction has been reported to occur in 1 to 6% of cases after stoma creation. It usually arises from failure to mobilize the bowel adequately. Without full mobilization, suture fixation of the bowel is not adequate to prevent retraction, and it is not recommended. Stoma retraction with loop stoma can cause incomplete fecal diversion.

Stoma retraction can lead to skin irritation and improper fixation of the stoma appliance. In mildly symptomatic cases, a convex faceplate and a tight belt may be used to control leakage around the appliance. Significant retraction requires operative revision. A local repair is the preferred initial approach. The full thickness of bowel is mobilized after the mucocutaneous junction is sharply divided, and a new stoma is created. This method is effective and can be done in an outpatient setting. Repair through laparotomy is indicated when the stoma has retracted almost completely. After adequate mobilization, a new stoma is created. This approach is also indicated when a local approach fails.

Small Bowel Obstruction

Small bowel obstruction (SBO) can occur in 10% of patients with loop ileostomy, much less with loop colostomy. The incidence is higher after surgery for inflammatory bowel disease than for cancer or other conditions. Management of SBO after stoma creation is not different from that of other postoperative SBO.

Stoma Fistula

A stoma fistula can arise from trauma or other disease processes such as Crohn's disease. Commonly, a fistula is created by excessive fat clearing or inadvertent excision of a diverticulum. Distal stoma fistulas are managed by

local operative revision with limited resection of the involved distal bowel.

LATE COMPLICATIONS

Skin Complications

Skin irritation is common and can be caused by various etiologies including improper stoma appliance fit, stoma retraction, prolapse, and parastomal hernia. Chemical irritant contact dermatitis arises from leakage of fecal material, and the underlying cause of improper appliance fit must be addressed. When the skin is chronically irritated, epidermal hyperplasia can result. Severe hyperplasia may require débridement or relocation of the stoma.

Stenosis

Stenosis usually results from ischemia or stomal retraction. Recurrence of Crohn's disease in the distal bowel close to the stoma can also cause stenosis. Dilatation of a stenotic stoma is contraindicated because it usually worsens the problem. If stoma stenosis is severe enough to produce symptoms, revision of the stoma is generally advisable. Local excision of scar tissue and formation of new mucocutaneous junction can resolve the stenosis.

Stoma Prolapse

Stoma prolapse is a full-thickness protrusion of intestine through the stoma. The incidence of stoma prolapse varies from 1 to 16%. The fixed type is most commonly caused by improper construction of the stoma that involves excessive protrusion of the stoma beyond the abdominal wall. The sliding type is not static in length, and it is more susceptible to incarceration. End stomas have a lower incidence than loop stomas. A common associated finding in prolapsed colostomy is a parastomal hernia. Up to 50% of patients with prolapsed colostomy also had a parastomal hernia.⁵

Predisposing factors for prolapsed stoma include obesity, increased intra-abdominal pressure, chronic obstructive pulmonary disease (COPD), bowel redundancy, and weak fascia. Technical factors that can lead to prolapsed stoma are improper stoma site outside the rectus muscle, oversized aperture, and redundancy of the distal bowel at the stoma site.

When a prolapse occurs in a loop stoma, it can cause incomplete fecal diversion. Most frequently it involves the distal limb of a transverse loop colostomy. The treatment of choice is conversion to an end stoma, with creation of a distal mucous fistula if there is distal obstruction. In patients with a permanent loop stoma, the prolapsed segment can be locally excised and a new stoma created. Patients with minimal prolapse or

asymptomatic prolapse can be managed conservatively without surgery. When the prolapse is significant with symptoms, there are two approaches to surgery: a local parastomal procedure or an intra-abdominal procedure. It is recommended that the local approach be attempted initially. If the stoma is temporary, the best approach is take-down of the stoma and reestablishment of bowel continuity.

Most stoma prolapse can cause cosmetic and pouch application problems. Nonreducible prolapse can lead to incarceration or strangulation of the bowel. Treatment of stoma prolapse is not usually urgent unless it is associated with strangulation or obstruction. Surgery can be planned electively.

In prolapsed ileostomy, operative repair entails local exploration with division of the mucocutaneous junction, delivery, and resection of redundant bowel. It is important to avoid resection of a significant length of small bowel to prevent short gut problems. Exploratory laparotomy with relocation may be necessary in patients with a large hernia-associated prolapse or those in whom local repair failed.

Local repairs such as postreduction intraluminal bowel fixation⁶ and modified Thiersch procedure⁷ were reported in pediatric patients with unimpressive results in treatment of prolapsed end colostomy. Abulafi et al recommended the use of a modified Delorme procedure.⁸ If local repair fails, relocation may be necessary.

An operative approach to prolapse in a loop colostomy is to convert to an end colostomy and modify the distal limb to a mucous fistula or a long Hartmann pouch. Prolapse usually occurs in the defunctionalized distal limb for unclear reasons. Recurrent colostomy prolapse may need completion colectomy and end ileostomy in some patients. When prolapse is associated with parastomal hernia, the best procedure should be selected on the basis of the optimal way to repair the hernia.

An incarcerated prolapse is not usually reduced by manual compression. Sugar can be sprinkled on the edematous stoma to reduce the swelling for an attempt at manual reduction. If there is vascular compromise, exploratory laparotomy is mandatory.

Advances in technology led to the use of a surgical stapler to resect the prolapsed intestine. Multiple studies have reported success in treating patients with prolapsed stoma by resecting the prolapsed bowel with a surgical stapling device.⁹⁻¹¹ They reported that the procedure not only is safe and effective but also can be done locally using minimally invasive technique.

Lymphoid Hyperplasia

Lymphoid hyperplasia is a benign condition that results from prolonged local trauma. There may be a fungating nodule on the bowel that slowly grows in size. Small nodules can be removed by topical application of silver

nitrate. Larger nodules need to be sent for biopsy to rule out a neoplasm. If a large nodule interferes with proper fitting of a stoma bag, it may need a local revision.

Stomal Varices

Stoma bleeding can be caused by local mucosal trauma or can be from variceal vessels at the mucocutaneous junction. However, upper or lower gastrointestinal bleeding must first be ruled out with endoscopy. With mucosal stoma bleeding, direct pressure with or without gauze soaked in epinephrine stops 98% of bleeding. Recurrent bleeding can be prevented by refitting the appliance to reduce trauma.

Bleeding from variceal vessels require further intervention. Local repair is indicated in patients with a short life expectancy, whereas a more invasive procedure to reduce the portal hypertension or liver transplantation is indicated in patients with a longer life expectancy. Local repair entails dividing the mucocutaneous junction to disconnect the stoma from peristomal skin. This disrupts the portosystemic communication, thereby reducing the varices.

Parastomal Hernia

Parastomal hernia is a very common complication after creation of a stoma. The incidence of hernia is reported to be ~50% (Fig. 2). It is more common after ileostomy than colostomy, and a parastomal hernia is more likely to occur in an end stoma. The incidence of parastomal hernia cannot be accurately reported because of differences in follow-up. Most parastomal hernias arise within few years after the initial operation but may arise as much as 20 years later. Some authors report that if patients are observed long enough, all will have parastomal hernias.

Clinical history and physical examination can help to diagnose parastomal hernia in a majority of the cases. When the diagnosis is equivocal, a computed

tomographic scan with oral contrast material can help identify the hernia. Most parastomal hernias do not require a surgical repair. Only about a third of parastomal hernias require operative repair. Ileostomy hernia is more likely to require operative repair.

Risk factors include obesity, advanced age, malnutrition, malignancy, COPD, and steroid use. Loop stoma, stoma through laparotomy incision, and stoma brought out lateral to rectus muscle are associated with a higher incidence of parastomal hernia. Extraperitoneal colostomy, urgently created stoma, postoperative abdominal complication (wound infection, urinary retention), postoperative radiation therapy, parastomal infection, and ascites are also reported to contribute to occurrence of parastomal hernia.

Absolute indications for surgery include incarceration, strangulation, obstruction, fistulization, perforation, and ischemia. Relative indications are history of incarceration, symptoms of obstruction, difficulty maintaining appliance fit, irrigation difficulty, pain, ulceration of skin, and cosmetic reasons. An absolute contraindication is end-stage cancer, and relative contraindications are recurrent, metastatic, inoperable malignancy; severe comorbidity; and temporary stoma.

Patients with asymptomatic or mildly symptomatic parastomal hernia can be managed nonoperatively. Management includes binders and belts that keep the hernia in a reduced state. When surgery is indicated, all contributing factors and relevant symptoms must be considered (Table 1).

Local repair, albeit the most simple, is associated with a high recurrence rate. It may be useful if there is a need to avoid the use of prosthetic material or more major surgery.

In patients who can tolerate a more extensive operation, stoma relocation becomes a more attractive option. Rubin et al showed that relocation was associated with lower recurrence than local fascial repair (33 versus 76%).¹² Relocation of stoma can be done either with or without formal laparotomy. Relocation of stoma without

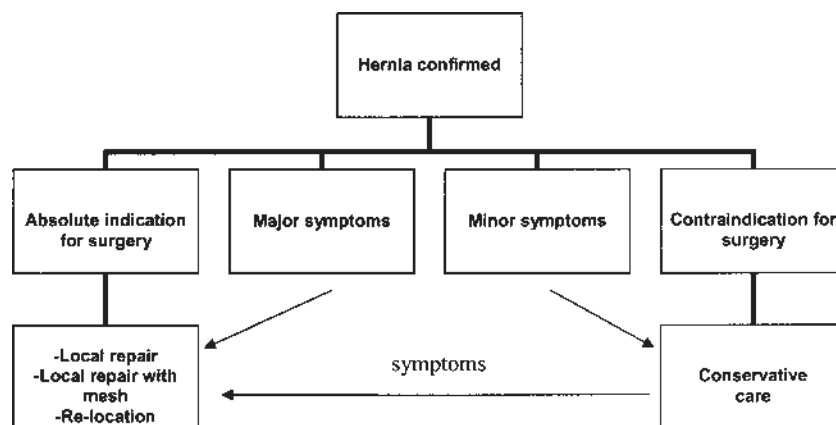


Figure 2 Management algorithm for parastomal hernia.

laparotomy does carry a concern of potential injuries to viscera because of the blind nature of the procedure. It is critical to mark the potential sites for the new stoma preoperatively. This approach may not be ideal in patients who underwent multiple previous operations.

A midline laparotomy incision, L-shaped incision outside the stoma device zone, or elliptical circumstomal incision can be used for local repair with prosthetic material. The use of mesh in repair of abdominal hernias has progressed significantly. Although many worry about the use of prosthetic material, with possible complications of mesh erosion and infection, after bowel preparation, nonabsorbable mesh can be used for elective repair of incisional hernia in the presence of open bowel with an expectation of minor morbidity, minimal risk of infection, and an acceptable rate of recurrence. Nonabsorbable mesh can be used for elective repair of parastomal hernia in a similar setting with a low risk of infection independent of the surgical approach.¹³

Local repair using prosthetic mesh has been popularized in the past few decades. With developments in prosthetic material, many studies have examined the use of different materials at different levels. Intraperitoneal mesh, first described by Sugarbaker¹⁴ and later modified by Stelzner et al,¹⁵ has been shown to be a good option in patients with a parastomal hernia with an associated large ventral hernia. A modified Sugarbaker technique uses a prosthetic mesh in the intraperitoneal onlay position. This led to recurrence rate of only 15% for the parastomal site and 20% for combined defects. However, there is still concern about the use of prosthetic mesh in contact with bowel.

In contrast, Kasperk et al¹⁶ described a technique placing a Vypro mesh in the plane between the rectus muscle and the posterior fascia or peritoneum. Longman and Thomson reported a similar technique of using polypropylene mesh on the posterior rectus sheath. This technique was designed to obviate erosion of the stoma bowel and to minimize infectious complications.¹⁷ In other cases, polypropylene mesh was placed either above the fascia only or above and below the fascia in a "stovepipe hat" fashion.¹⁸ This led to recurrence rate of 26% at a mean follow-up of more than 4 years. Even though mesh was placed in direct contact with the bowel, only one patient had mesh erosion, and no patient required removal of the mesh.

Repair of parastomal hernias using AlloDerm acellular dermal matrix as a substitute for a synthetic graft has been reported in a small series of patients. The authors recommended the use of AlloDerm because of its resilience to infection and tolerance to an open wound without having to be removed. Larger studies with long-term follow-up are needed for further assessment of the long-term outcome for hernia recurrence with the use of AlloDerm.¹⁹

Laparoscopic repair of parastomal hernias has gained some recent interest with improvements in technique and technology. However, a study by Safadi²⁰ showed that the laparoscopic approach failed in 56% of patients, all within 6 months of the operation. He concluded that laparoscopic repair of parastomal hernia cannot be recommended at this time. However, a better outcome with the laparoscopic approach in the repair of parastomal hernias has been reported,²¹ and more studies are needed to better evaluate the efficacy of the laparoscopic approach.

Some have proposed the use of prophylactic mesh placement during the initial operation when the stoma is created. This practice will not be widespread because of the concerns about using synthetic material in the presence of open bowel. Janes et al²² reported a study of a large-pore lightweight mesh with a reduced polypropylene content and a high proportion of absorbable material (Vypro) being placed in a sublay position. They reported that this was not associated with complications, and it significantly reduced the rate of parastomal hernia.

No single technique to repair a parastomal hernia has been proved to be most effective. Advances in prosthetic materials and surgical techniques added to the many surgical options that are already available. Randomized studies comparing various techniques and prosthetic materials may define the ideal surgical management of parastomal hernia.

CONCLUSION

Stoma complications are common and can arise in variety of ways of different clinical significance. The best way to manage a stoma complication is by prevention. Preoperative planning and good intraoperative technique can eliminate many potential postoperative complications. When reoperation is indicated for stoma complications, the patient's input is essential in the management.

DISCLOSURE

The authors have no conflicts to disclose relative to this article.

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